

THE OCCURRENCE IN WATERS AROUND THE CANARY AND CAPE VERDE ISLANDS OF *AMPHIONIDES REYNAUDII*, THE SOLE SPECIES OF THE ORDER AMPHIONIDACEA (CRUSTACEA: EUCARIDA).

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ABSTRACT

The Eucaridean Order Amphionidacea includes only one known species, *Amphionides reynaudii*. One of the characteristics distinguishing the Order is strong sexual dimorphism. This species is found in all oceans between 36°N and 36°S, the zoeas living near the surface but the adults at great depth. A specimen of a zoea was taken during the TFMCBM/98¹ Cabo Verde Cruise off San Nicholas island (NW of the Cape Verde Archipelago). The zoea was of a late developmental stage originally described as the penultimate zoea but subsequent work indicated that it was the last zoeal stage of the female. The present specimen had setose pleopods developing within the non-setose cuticle, confirming that it is the last zoea.

RESUMEN

El Orden Eucarideo Amphionidacea, una de cuyas características más distintivas es su acusado dimorfismo sexual, incluye sólo una especie conocida, *Amphionides reynaudii*. Esta se distribuye por todos los océanos entre 36° N y 36° S, las zoeas cerca de la superficie, mientras que los adultos prefieren vivir a gran profundidad. En el curso de la campaña *TFMCBM/98 Cabo Verde* (incluida en el *Proyecto Macaronesia 2000* del Museo de Ciencias Naturales), un espécimen de zoea de este interesante orden fue recolectado en una pesca planctónica cerca de la isla de San Nicolás (NO del Archipiélago). La zoea fue originalmente descrita como en penúltima fase de desarrollo, aunque trabajos más exhaustivos pusieron de manifiesto que se trataba de la fase final de una hembra (♀), puesto que el espécimen presentaba pleópodos setosos desarrollándose dentro de una cutícula no setosa, característica que confirma este estadio.

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1.- INTRODUCTION

Amphionides renaudii was first described as *Amphion reynaudii* on the basis of larvae from the Indian Ocean (MILNE EDWARDS [5]). Subsequently larvae were identified as 4 species before the adult was described and named as *Amphionides valdiviae* ZIMMER [9]. A full account of larval development (HEEGAARD [3]) demonstrated that all the previously described forms could be referred to a single species with a distribution in all oceans between 36°N and 36°S.

WILLIAMSON [7] has given an account of the varying opinions as to the taxonomic position of *Amphionides*. Initially it was thought that they were close to the Phyllosoma larvae of Palinuridea, then that they were larvae of *Polycheles* (*Eryoneicus* larvae are now known to be the larvae of this genus), or related to Sergestids or the Caridean larval genus *Eretmocaris*. Following the description of the adult, *Amphionides* was considered to be a Caridean, albeit forming a distinctive family or sub-tribe. WILLIAMSON raised it to the status of an Order, the Amphionidacea, on the basis of sexual dimorphism, the distinctive form of thoracic brood pouch in the female, the thoracic limbs, the abdominal pleura, the branchiae and the nature of the larvae. The Amphionidacea thus become one of three Orders, with the Euphausiacea and Decapoda, in the Superorder Eucarida,

The larval stages mainly occur in the epipelagic zone. HEEGAARD [3] concluded that they were most abundant in the upper 30m, WILLIAMSON [7] found that most occurred above 100m. No evidence has been presented for differences in vertical distributions between these stages. The adults however usually occur much deeper. ZIMMER [9] found them at about 4000m depth. HEEGAARD [3] gave a range of 2000-5000m where he would expect new record of adults, although he recorded one adult female at about 60m depth. WILLIAMSON found specimens in closing nets sampling between 700 and 1700m and open nets sampling from 3700m depth to the surface. GURNEY [1] recorded 3 specimens from between 2700m and the surface.

1.1. Records from the eastern Atlantic near the Canary and Cape Verde Islands

A specimen was taken in a diurnal haul (24C98D reference) with a triple no-closing net WP-2 (200 μ standard for the mesozooplankton with a diameter open mouth 56 cm/by net,

6658 m³ water filtered in 1000 meters of haul selon the information of a flowmeter installed) between 1000 m depth to surface (bottom 1200 meters) at the station 16° 38' 90'' N and 24° 49' 36'' W (off San Nicolau Island) at 15,55 p.m. on September 24, 1998 during a TFMCBM/ 98 Cabo Verde-Cruise, supported by the Natural Sciences Museum of Tenerife on the "Corvette" ship as part of a *MACARONESIA 2000 PROGRAM*. The specimen captured was identified as a late zoea stage of the type described by HEEGAARD [3] as a zoea XII.

There are previous records of the species near the Canary Islands and Cape Verde Islands from ZIMMER [9], GURNEY [1], HEEGAARD [3] and WILLIAMSON [7]. ZIMMER recorded adults near Madeira and off Cape Palmas. GURNEY'S records were of larvae from the Canary Islands (29°27'N, 15°07'W) and Cape Verde Islands (14°39'N 25°51'W). HEEGAARD recorded both adults and larvae near the Canary Islands. WILLIAMSON examined specimens from samples taken south-west of Cape Verde within the area 10°14'-11°35'N, 19°51'-21°26'W and one sample from south-west of the Canary Islands (25°00'N, 19°36'W). He also reported that metamorphosed specimens were taken in the region of Cape Verde, Senegal by FOXTON (unpublished) (in Addendum to WILLIAMSON [7]).

1.2. Morphology

The early zoea stages closely resemble caridean larvae (HEEGAARD [3]). According to WILLIAMSON [8] thoracopods 1 and 2 (the first and second maxillipeds) are well separated in *Amphionides* but are close together in the Caridea. At about the sixth zoea stage the carapace starts to become dorso-ventrally flattened, a characteristic that contributed to the suggestion of a relationship to phyllosoma larvae (WILLIAMSON [7]). No chelae or pseudo-chelae develop in the later stages in contrast with the late zoea stages of Caridea.

The work of GURNEY [1 & 2] and LEBOUR [4] indicated that there were 9 zoea stages but HEEGAARD described 13 "mysis" (zoea) stages. WILLIAMSON [7] concluded that the number of stages may be variable and that HEEGAARD's stages XII and XIII are not successive stages but the last zoal stages of the female and male respectively. There is one immature post-larval stage (megalopa) in the female. The zoeas range in size from 4.0mm to 25.0mm (male last zoea). HEEGAARD [3] concluded that the first zoea was the first free

living stage. However GURNEY [2] noted the occurrence of a stage with no rostrum without further description or illustration and HEEGAARD speculated on the possibility of the existence of a short-lived “promysis” (prezoea) stage.

The carapace of the adult female is extremely thin and nearly always badly damaged in net caught specimens. The descriptions by GURNEY [1], HEEGAARD [3] and WILLIAMSON [7] have depended on examination of several specimens with differing patterns of damage. The carapace is inflated to form what WILLIAMSON [7] interpreted as a brood chamber. The absence of eggs from any of the >100 specimens examined by various authors is evidence that the eggs are not attached to the pleopods, as they are in most decapods, but are retained loose in the thoracic brood chamber and have been lost when the delicate carapace was damaged. The mouthparts and digestive system are vestigial and none of the thoracic limbs are functional maxillipeds so it is unlikely that the adult female feeds. The abdomen and pleopods are robust in contrast with the thorax. The first pleopods are much enlarged, uniramous, U-shaped at the distal end and reaches far forward into the carapace. They may form a partial closure of the brood chamber in life (WILLIAMSON [7]). As yet there is no record of an undamaged female and no specimen has been taken with eggs retained in the brood chamber. Availability of such specimens would provide the opportunity to confirm aspects of the biology of the species that remain uncertain.

WILLIAMSON [7] concluded that the stage described by ZIMMER [9] and GURNEY [2] as the female and by HEEGAARD [3] as the first post-larval stage, is in fact the male. If it were not sexually mature it would be considered to be a megalopa according to Williamson's (1969) system. The carapace is more inflated than in the zoeal stages but less so than in the female, The mouthparts and alimentary system appear fully functional, but there are no setae on the epoxites of the 2nd to 7th thoracopods. The pleopods are setose and the 1st resembles the others except for the small size of the endopod.

The present specimen is illustrated in Figure 1. The total length of the specimen is 24.1mm, the carapace length is 13.3mm and its width is 4.3mm, the abdomen was 7.1mm long and the telson length is 3.7mm. The equivalent measurements for this stage given by HEEGAARD [3] were 23mm, 13mm, 4mm, 8mm and 2.5mm respectively. HEEGAARD gave a full description of the appendages of this stage. There are setose pleopods developing

within the non-setose cuticle, confirming WILLIAMSON'S [7] opinion that this is indeed the last zoea stage.

Examples of earlier zoea stages described by HEEGAARD [3] and the adult female, adapting the figure from WILLIAMSON [7] with amendments consistent with HEEGAARD'S figure of that stage are given in Figure 2.

2. REFERENCES

- [1] GURNEY, R., 1936. Larvae of decapod Crustacea, 2. Amphionidae. *Discovery Rep.* 12, 392-399.
- [2] GURNEY, R., 1942. *The larvae of the decapod Crustacea*. Ray Society. 308pp.
- [3] HEEGAARD, P., 1969. Larvae of decapod Crustacea. 2. Amphionidae. *Dana Rep.*, 77, 1-82.
- [4] LEBOUR, M.V., 1950. Notes on some larval decapods (Crustacea) from Bermuda.-II *Proc. Zool. Soc. Lond.* 120, 743-747.
- [5] MILNE EDWARDS, H., 1832. Note sur un nouveau genre de Crustacés de l'ordre des Stomatopodes. *Annl. Soc. Ent. France.* 1, 336-340.
- [6] WILLIAMSON, D.I., 1969. Names of larvae in the Decapoda and Euphausiacea. *Crustaceana*, 16, 210-213.
- [7] WILLIAMSON, D.I., 1973. *Amphionides reynaudii* (H. Milne Edwards), representative of a proposed new order of Eucaridan Malacostraca. *Crustaceana*, 25, 35-50.
- [8] WILLIAMSON, D.I., 1982. Larval morphology and Diversity. In: *The Biology of Crustacea*, Vol. 2, Embryology, Morphology and Genetics. D.E. Bliss ed., Academic Press, New York, pp 43-110.
- [9] ZIMMER, C., 1904. *Amphionides valdiviae* n.g. n. sp. *Zool. Anz.* 28, 225-228.

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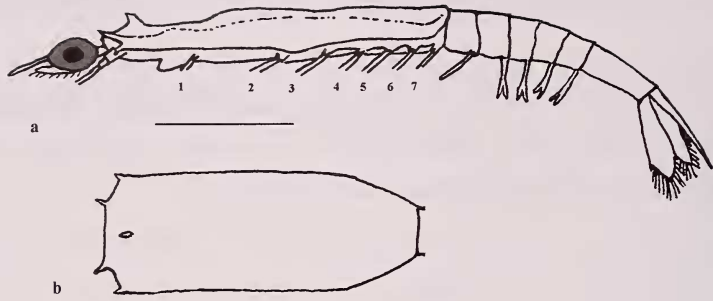
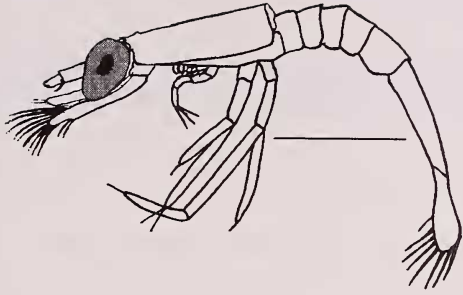


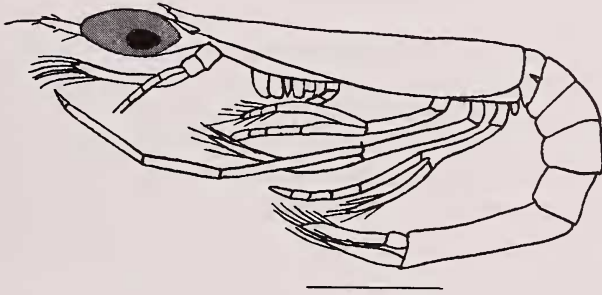
Figure 1. *Amphionides reynaudii* zoea from sample 24C98 D (1000-0m) in the TFMCBM/98 Crusie. (a) Lateral view with bases of thoracopods shown and numbered (1 is a maxilliped, 2 and 3 were described by Heegaard as maxillipeds but are not functional feeding appendages and 4-7 are pereopods) details of appendages are described by Heegaard (1969). (b) Dorsal view of carapace. Scale bar =5mm

Figure 2 (next page). *Amphionides reynaudii*. a) Zoea I after Heegaard (1969), scale bar 1mm, b) Zoea II after Heegaard (1969) scale bar 1mm, c) adult female modified from Williamson (1973) and Heegaard (1969). Scale bar 5mm.

a



b



c

